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PROBLEMS OF TRAUMATOLOGY AND RESTORATIVE SURGERY  
DURING THE SEVEN-YEAR PLAN

- USSR -

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PROBLEMS OF TRAUMATOLOGY AND RESTORATIVE SURGERY  
DURING THE SEVEN-YEAR PLAN

[This is a translation of an article written by Prof I. M. Grigorovskiy in Sovetskaya Meditsina (Soviet Medicine), Vol 23, No 12, Moscow, 1959, pages 3-7.]

In respect to medical problems of the Seven-Year Plan which are under consideration by the Academy of Medical Sciences [AMS] USSR, an important place is occupied by problems of traumatology, reconstructive surgery, and contiguous fields. Much attention is concentrated on the prevention of traumatism in the leading branches of industry and agriculture.

This refers, in the first place, to the coal industry where at the present time the highest rate of temporary loss of work-capacity due to trauma has been noted. Not the least important is the organization of rational preventive measures directed against traumatism in enterprises of the metallurgical, petroleum, machine-building, forestry, and chemical industries.

An important task of the Seven-Year Plan is the prevention of traumatism not connected with industry (street, transportation, home traumas, etc.), as well as the prevention of traumatism in children, and exercises connected with physical culture and sport. The immediate task is to perfect further the treatment of bone fractures and to increase the number of favorable results.

Also very important is the development of new, improved methods of immobilization and osteo-synthesis which must be highly effective and highly appropriate physiologically (the least harmful methods). Serious attention must be given to the elucidation and elimination of causes of retarded bone union, prevention of false joints, and development of such methods of therapy as would contribute to the acceleration of processes of union of fractures and formation of bone calluses. The treatment of intra-articular fractures is still very unsatisfactory; one must achieve a more perfect restoration of the functions of the extremity in these types of traumas. Definite success has already been achieved in the treatment of wounds, however, further study is required of methods of delayed primary treatment of wounds, pathophysiology of the

course of the wound process, antibiotics (especially in the system of therapy of complicated wounds), problems of microbial resistance to antibiotics, application of primary sutures in open injuries, primary plastics in the defects of tendons and skin, etc.

Of great importance is the perfecting of the treatment of burns, especially of first-aid methods to patients arriving in large numbers, the method of primary treatment of burns and new, rational primary dressings -- of plastics, in particular.

The use of the Soviet synthetic preparation -- aeroplast -- offers great possibilities at the present time. It has been successfully employed at the Institute of Surgery imeni A. V. Vishnevskiy AMS USSR in second-degree burns. This preparation is soluble in acetone and is sprayed in a thin layer over the burned surface. Upon the evaporation of acetone, the affected skin remains covered with an elastic layer of plastics which protects the body surface from external influences and infections.

In the treatment of burns American authors use various vegetable enzymes which dissolve the damaged skin protein.

Further development is needed of measures of combatting shock and toxemias in burns, methods of prevention of infections and sepsis in burns (the same applies to frostbite), study of the function of the hormonal system in burns, as well as in other forms of trauma.

In connection with the use of early cutaneous plastics, the development of new methods of transplantsations in which the plastic (preserved) material will be used is bound to acquire great importance in [the treatment of] burns.

In order to achieve a more successful solution of the problem of combatting burns, the hospitals (principally in large centers of the country) will have to create special ("burns") departments.

The wide application of electric power requires the perfection of measures of prevention of electrical traumas (in industry and at home), study of the pathophysiology of electrical traumas, development of rational methods of first-aid and additional treatment of patients affected by an electric current.

There is need for thorough study and perfection of methods of rendering medical first-aid and additional treatment in the traumas of various organs and systems (the cranial cavity, organs of the thorax, abdominal cavity, genito-urinary system, etc.).

Traumas of the nervous system (industrial, agricultural, or of street origin) are very frequent. Nevertheless, the

pathophysiological processes taking place in the nervous system, following trauma, still remain insufficiently clarified.

Particular attention must be paid to the closed trauma of the central nervous system, on a more precise definition of diagnosis and methods of therapy of a closed trauma of the cranium, study and prevention of complications, perfection of therapy of remote sequelae of these trauma -- including, also, neuropsychic disturbances. In this respect it is of the utmost importance to perfect further the methods of conservative and surgical treatment of traumas of the brain, spinal cord, and peripheral nerves, as well as methods of closing cranial defects, the use of ganglio-blocking substances, endocrine preparations, enzymes, and vitamins.

It is necessary to perfect the therapy of inflammatory processes and other complications following brain trauma, the study of the compensatory processes following trauma of the nervous system, and the organization of institutions for the completion of treatment and work arrangements for those who have suffered a serious trauma. In regard to maxillo-facial traumas, further methods must be perfected of the conservative and surgical treatment of jaw fractures, plastic therapy of fresh defects of facial soft tissues and extensive granulating wounds, methods of repairing extensive combined defects of the face and scarification defects of the larynx, pharynx, and esophagus.

It is also important to employ new types of plastics and alloys, and to create new apparatuses for orthopedic stomatology.

Of great importance are the prophylaxis and treatment of eye traumas, perfection of methods of prevention of complications in eye injuries (endophthalmitis, iridocyclitis, sympathetic inflammation), organization of traumatological aid in injuries of the ear, nose, and throat, (the incidence of mechanical traumas to otorhino-laryngological organs is still quite high), study of problems of impairment of hearing of traumatic origin and ways of combatting it.

An important task that lies ahead is the perfecting of diagnostics and therapy when foreign bodies are lodged in the larynx, trachea, bronchi, and esophagus, as well as the therapy of burns of the mouth, pharynx, larynx, and esophagus cavities in children and adults.

The problem of pain has great significance in traumatology. A thorough study is needed of the pathogenesis of pain and the painfactor, as well as a study of the condition of the central nervous system and metabolic processes in the organism in traumas. Prevention of shock in traumas and

combatting the pronounced forms of shock are urgent tasks of future studies. In addition to the study of methods of blood transfusion, we must study the synthetic and heteroprotein blood substitutes in order to develop inexpensive and universal methods of combatting shock, especially of the etiology of burns.

No less important is the problem of anaesthesia in rendering first-aid and additional treatment at various stages of suffering from trauma, especially in surgical intervention. With this fact in view, it should be the practice of traumatological institutions to include within the Seven-Year Plan a wider use of intratracheal narcosis involving the employment of ganglio-blocking substances, neuroplegic means, and curare-like muscle relaxing preparations. The positive features of this type of narcosis are the small dosage of the narcotic substance, auxiliary and controlled breathing, the ease of removal of mucosa from the bronchi during narcosis, as well as exclusion of the consciousness of the patient, a fact which prevents the development of negative emotions during extensive operations.

The problem of transplantation of homogeneous and heterogeneous tissues is one of the most important problems of restorative surgery. The basic difficulty of the problem of homogeneous transplantation is the incompatibility of tissues. Its solution requires studies in search of various methods of preservation which would ensure reduction of the antigenic properties of tissues, study of immunological reactions of the human organism upon transplantation of tissues, the development of methods of obtaining antigens from various transplants, etc.

It is necessary to introduce tissue transplantation into wide medical practice and to ensure stable preservation of full-value supplies (skin, bones, peritoneum, dry plasma, cartilage, blood vessels, fasciae, dry cerebral membrane, etc.).

Clinical observations conducted in the Institute of Surgery imeni A. V. Vishnevskiy of the AMS USSR on patients having undergone operations for traumatic aneurysms which employed arterial lyophilic homogeneous transplants showed their expediency in the restitution of passability of vessels following the excision of the aneurysmal bag. It has been demonstrated that blood vessels which had been preserved by means of cooling and desiccation retain their property to form protein from amino acids after transplantation into an organism. The clarification of conditions under which restitution brings most favorable results will help in perfecting the methods of plastic operations.

Various plastics are currently of great value in

correcting plastically defects of bone, soft tissues, and blood vessels: derivatives of acrylic acids, polyvinyl alcohol, caprone, nylon, and other plastic substances. The use of new plastics in an ever-increasing volume requires the study of their physico-chemical properties, stability, reaction of the organism to their introduction, and long-range results of their employment. In traumatology as well as in orthopedics, health resort and physical factors assume an increasing importance, particularly in the treatment of diseases of the joints. The study and calculation of the incidence of deforming diseases must contribute to the further improvement of preventive measures, expansion of the volume of orthopedic therapy, and implementation of necessary correction in the deformations of skeletal bones.

The orthopedics of adults requires, first of all, study of the pathology of the large joints in order to develop rational methods of treatment and prevention of progressive development of these diseases. We must continue the thorough study of problems of etiology and pathogenesis of the osteo-articular apparatus, Paget's disease, ankylotic polyarthritis, arthroses, fibrous dystrophy, etc.

A thorough study is urgently needed of the physiology and pathology of bone tissue, and of the metabolic and restorative processes which take place in it; this is an essential requisite in the further improvement of methods of diagnosis and treatment of orthopedic diseases and primary and metastatic bone tumors. Also, a thorough study is needed of the various forms of spastic paralysis (Little's disease, hemiparesis), hyperkinesia, muscular dystonia, and similar disturbances; the main task in this direction is the development of the most rational methods of restoration of lost motor functions and disturbances of coordination. In order to achieve a rational solution of these problems, of basic importance is the cooperative participation of representatives of theoretical and practical medicine (particularly, neuro-physiologists and surgeons) in the development of therapeutic measures necessitating an evaluation of the state of the state of the nervous system and the possibility of developing and utilizing the compensatory processes.

In the field of child orthopedics there are in prospect advances in the early diagnosis and treatment of various diseases and deformations of the supporting motor apparatus, the prevention and complex treatment of scoliosis (enlisting the cooperation of workers in school hygiene), the study of the etiology and pathogenesis of various forms of scoliosis, the fight against the trend toward faulty posture and deformations of the spinal column, and the prevention and

treatment of deformations of the supporting motor apparatus in poliomyelitis. Included in the above are clinico-physiological studies of processes of restoration and compensation, the development of rational methods of complex therapy (including surgery) of the residual phenomena of poliomyelitis, and methods of sanatoria and health-resort treatment and work arrangement for patients who retain crippling sequelae of the disease.

In programs of future studies an important place must be occupied by the improvement of methods of restorative surgery on large joints, stabilization of loose joints, elongation of extremities, tendon-muscular plastics, etc. All this, in addition to providing patients who suffer from deformations of the supporting motor apparatus and sequelae of poliomyelitis with rational prosthetic orthopedic devices, will enable many incapacitated individuals to stand erect and find work.

We must not forget further restorative treatment of the disabled of World War II, especially those with sequelae of the spinal column and spinal cord injuries, osteomyelitis, etc., which also will require prolonged studies in this direction.

The workers in the prosthetic field face serious and responsible problems during the Seven-Year Plan in regard to the improvement of the quality of manufactured prosthetic appliances, as well as the perfection of present day devices and the creation of new ones.

One of the foremost tasks is the development of light prosthetic devices of the lower extremities, including improvement in the construction of hinges with the utilization of automatic devices and reliable light braces, as well as the manufacture of new types of prosthetic devices of the upper extremities of superior functional quality.

The development of scientific studies in 1959-65 must proceed along the lines of creation of various new models of exo- and endo-protheses. The progress and growth of the chemical industry opens immense possibilities in this direction.

Plastics are finding an ever-increasing use in medical practice: protheses of fingers and cosmetic coatings for the functional protheses of hands are now made of plastics possessing great elasticity. The Central Institute of Traumatology and Orthopedics in Moscow manufactures comfortable and light prosthetic devices for the shin and femur from plastics also, various appliances for the treatment of defomations of feet and toes are made of plastics: supinators, heel supports, cover plates, etc. Individual eye protheses are made of

plastics, and plastics are also used in filling and treatment of teeth.

High molecular synthetic resins are still insufficiently studied, these include levsan, polyurethane, many varieties of poroplasts, and other types of polymers. For further studies it is necessary to expand the scientific experimental base of the utilization of plastics in medicine at the Central Institute of Traumatology and Orthopedics, and to organize cooperative contact between physicians and both the scientific research institutes of the chemical industry and the appropriate chairs of higher educational institutes; these works must also be carried out in cooperation with biologist, construction personnel, and engineers.

One can state without exaggeration that intra-osseous metallic osteosynthesis has effected great changes (if not a veritable revolution) in the treatment of fractures of long tubular bones, particularly of diaphyseal fractures of the femur. In spite of the fact that there is no uniformity of belief regarding indications and contra-indications of intramedullary metallic osteosynthesis, the use of this method is constantly becoming more precise and extensive (for closed and open gunshot fractures, false joints, bone defects, fractures of the femur which do not heal quickly, and fractures of the shin, forearm, and even carpal bones). This method is not contra-indicated even in children starting of six to seven years of age. Reliable fixation and good adaptation in intra-osseous synthesis ensure the timely use of therapeutic physical culture, facilitate the care of patients, and considerably reduce their hospitalization.

Now, let us discuss the question of plastic pins. Pins from new, plastic, non-reactive materials (fast-hardening resins in combination with fillers and hardeners) were recently successfully employed in the USSR by S. F. Fedorov for intramedullar fastening of bone fragments. G. V. Golovin and P. P. Novozhilov suggested a synthetic glue -- osteoplast which is indicated in osteoplastic operations to cement bone fragments in multifragment fractures, for filling the tubular bones of transplants in order to increase their strength, etc. However, metallic as well as plastic pins are used only in the case of definite indications. The same refers to the plastics of the whole joint.

American authors state that plastics, though preferable to metal because of their lightness, chafe easily, wear out, and break. In connection with this, it has been suggested to use stellite for a whole joint; this a metal alloy containing cobalt and chromium [tungsten and molybdenum, as well]. This material was tested in the United States on

injured watchdogs with good results; they were able to be used again as normally functioning watchdogs.

In 1957 a femoral joint completely metallic, made of stellite, was inserted in a man by Wilson (Columbia University Hospital). It is the task of researchers to study new materials to be used as substitutes for plaster of Paris. The plastics serve the purpose, they are lighter than gypsum, their use is more hygienic, and their use permits direct X-ray observations.

There is no doubt that during the Seven-Year Plan our scientists will solve successfully the great tasks facing them in the field of traumatology and restorative surgery.

END